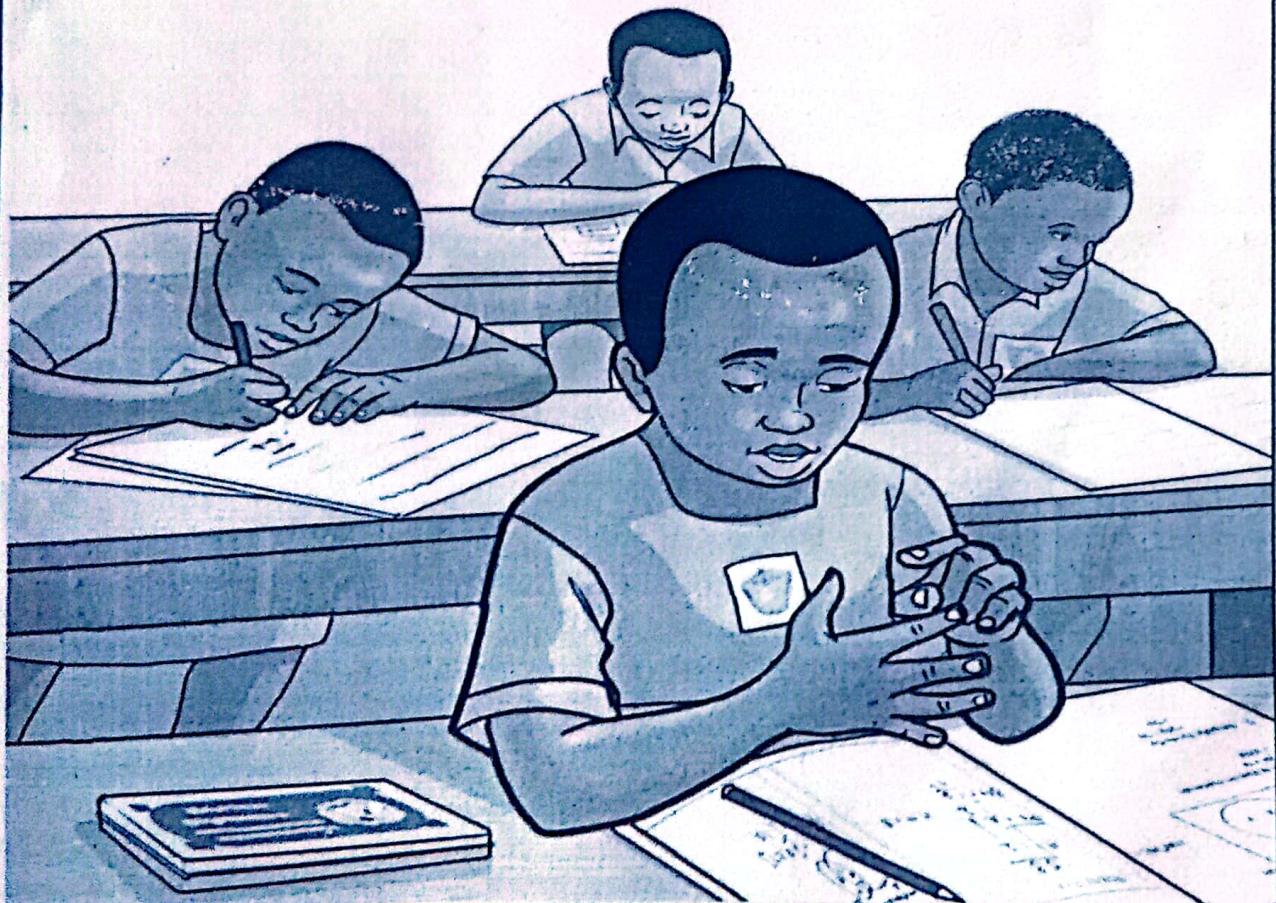


SUREKEY EXAMINATIONS BOARD



"Don't speak for Quality, Let Quality Speak for itself"

2024



**MATHEMATICS LOWER SERIES
OFFICIAL MARKING GUIDE**

SECTION A: 40 MARKS

Answer all questions in this Section
Questions 1 to 20 carry two marks each

1. Workout: $124 \div 4$.

$$\begin{array}{r} 31 \\ 4 \overline{)124} \\ 12 \\ \hline 4 \\ 4 \\ \hline 0 \end{array}$$

$124 \div 4 = 31$

$$\begin{array}{r} 31 \\ 4 \overline{)124} \\ 12 \\ \hline 4 \\ 4 \\ \hline 0 \end{array}$$

$$124 \div 4 = 31$$

2. Write "One hundred thousand, one hundred nine" in figures.

$$\begin{array}{r} 100,000 \\ + 109 \\ \hline 100,109 \end{array}$$

3. Given that $Q = \{ \text{all prime numbers less than } 10 \}$. Calculate the number of proper subsets in Set Q.

$$\begin{aligned} Q &= \{ 2, 3, 5, 7 \} \\ \text{Number of proper subsets} &= 2^n - 1 \\ &= 2^4 - 1 \\ &= (2 \times 2 \times 2 \times 2) - 1 \\ &= 16 - 1 \\ &= 15 \text{ proper subsets} \end{aligned}$$

4. The following lengths of five trees in a school compound were recorded during an environment survey: 51cm, 69cm, 53cm, 61cm and 64cm. Find the median length of the trees.

51cm, 53cm, 61cm, 64cm, 69cm

Median = 61cm

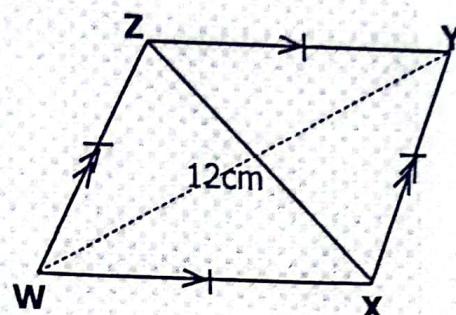
5. Calculate the highest number of children that can share either 18 or 24 rulers leaving no remainder.

2	18	24
3	9	12
3	3	4

$$\begin{aligned} \text{G.C.F} &= 2 \times 3 \\ &= 6 \text{ children} \end{aligned}$$

The highest number of children is 6

6. The area of the figure below is 90cm^2 .



Find the length of the diagonal WY .

$$\begin{aligned}\frac{d_1 \times d_2}{2} &= \text{Area} \\ \frac{12\text{cm} \times d_2}{2} &= 90\text{cm}^2 \\ \frac{12\text{cm} \times d_2}{2} \times 2 &= 90\text{cm}^2 \times 2 \\ \frac{12\text{cm} \times d_2}{12\text{cm}} &= \frac{90\text{cm}^2 \times 2}{12\text{cm}} \\ d_2 &= 15\text{cm} \\ \text{Diagonal } WY &= 15\text{cm}\end{aligned}$$

7. Simplify: $5a - 3(2 + a)$

$$\begin{aligned}5a - 6 - 3a \\ 5a - 3a - 6 \\ 2a - 6\end{aligned}$$

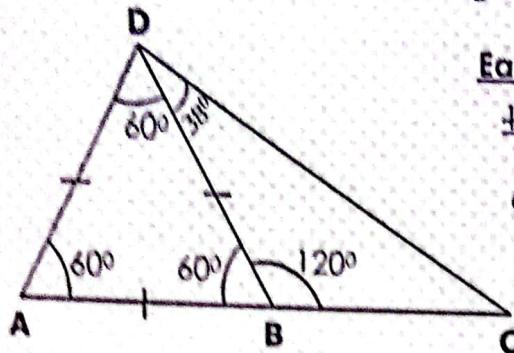
8. Find the next number in the sequence below.

$$\begin{array}{ll}1, 2, 5, 11, 21, 36, \dots & 1 + 1 = 2 \\ & 2 + 3 = 5 \\ & 5 + 6 = 11 & 11 + 10 = 21 \\ & & 21 + 15 = 36 \\ & & 36 + 21 = 57\end{array}$$

9. Harriet had 5 packets of yoghurt each weighing 2500ml. Find the weight of the packets in litres.

$$\begin{aligned}1 \text{ packet weighs } 2500\text{ml} \\ 5 \text{ packets weigh } 2500\text{ml} \times 5 \\ 5 \text{ packets weigh } 12500\text{ml} \\ 1000\text{ml} = 1 \text{ litre} \\ 12500\text{ml} = \frac{12500\text{ml}}{1000\text{ml}} \\ 12500\text{ml} = 12.5 \\ 12500\text{ml} = 12.5 \text{ litres}\end{aligned}$$

10. In the figure below, ABC is a straight line, ABD is an equilateral triangle.



Each angle in an equilateral triangle

$$\begin{array}{r} 180^\circ \\ \hline 3 \\ 60^\circ \end{array}$$

Find the size of angle BCD in degrees.

$$\begin{aligned} BCD + 120^\circ + 38^\circ &= 180^\circ \\ BCD + 138^\circ &= 180^\circ \\ BCD + \cancel{138^\circ} - \cancel{138^\circ} &= 180^\circ - 138^\circ \\ BCD &= 42^\circ \end{aligned}$$

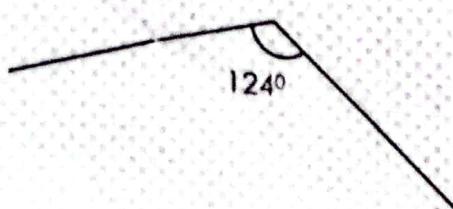
11. A water tank was $\frac{2}{3}$ full of water, before $\frac{1}{3}$ of it was sold by the owner.
What fraction remained after selling some water?

Fraction of Water sold	Fraction of Water that remained
$\frac{2}{3}$ of $\frac{1}{3}$	$\frac{2}{3} - \frac{2}{9}$
$\frac{2}{3} \times \frac{1}{3}$	$\frac{2}{3} \times \frac{2}{3} - \frac{2}{3} \times \frac{1}{3}$
$\frac{2}{9}$	$\frac{2}{9}$
	$\frac{6-2}{9}$
	$\frac{4}{9}$

12. Convert 4600 square centimetres to square metres.

$$\begin{aligned} 100\text{cm} &= 1\text{m} \\ (100\text{cm} \times 100\text{cm}) &= (1\text{m} \times 1\text{m}) \\ 10000\text{cm}^2 &= 1\text{m}^2 \\ 4600\text{cm}^2 &= \frac{4600}{10000} \\ 4600\text{cm}^2 &= 0.46\text{m}^2 \end{aligned}$$

13. Use a protractor to measure the size of the angle below.



14. Express $12\frac{5}{2}\%$ as a common fraction in the simplest form.

$$12\frac{5}{2}\% = \frac{100}{1} \\ 25 = \frac{100}{4} \\ 2 \\ \frac{25}{2} \times \frac{1}{1} \\ 2 \quad \frac{25}{2} \\ \frac{1}{2} \\ 25\%$$

$\frac{1}{3}$

15. Suzan bought 6 heaps of mangos at Sh. 7,200. How many heaps would she buy for Sh. 4,800. For the same type of mangos?

6 heaps cost Sh. 7200

1 heap cost Sh. 7200

1
1 heap costs Sh. 1200

Sh. 1200 buy 1 heap

Sh. 4800 buy $(\text{Sh. } 4800 \div \text{Sh. } 1200)$ heaps

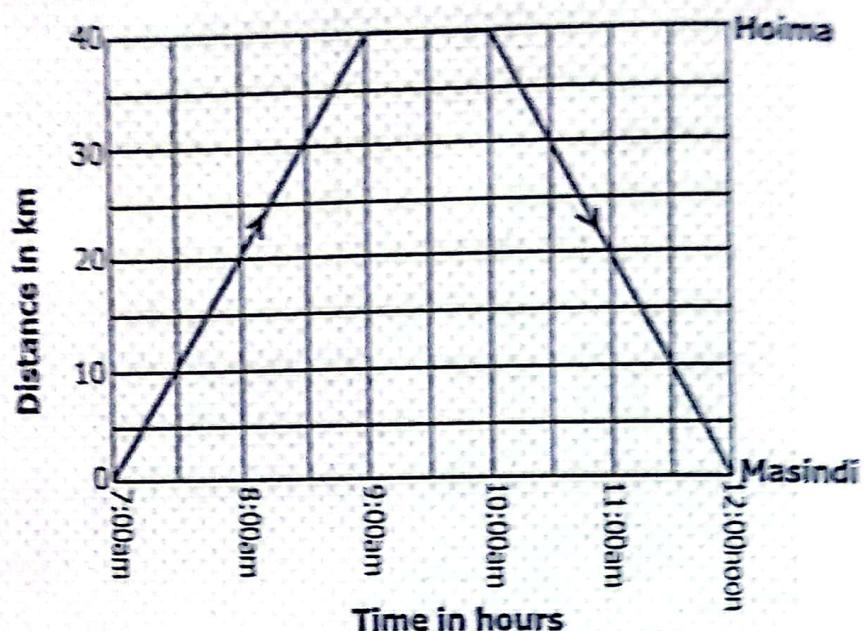
Sh. 4800 buy 4 heaps

16. A car covered a distance of 880cm in four revolutions. Calculate the diameter of the car wheel.
(Use π as $\frac{22}{7}$)

Distance	= Number of revolutions
Circumference	
880cm	= 4
<u>C</u>	
<u>880cm</u> $\times C = 4 \times C$	
<u>C</u>	
<u>$\frac{880}{4}$cm</u>	$= \frac{4C}{4}$
$C = 220\text{cm}$	

πd	= <u>C</u>
$\frac{22}{7}d$	= <u>220\text{cm}</u>
$\frac{22}{7}d \times 7$	= <u>$220\text{cm} \times 7$</u>
$\frac{22d}{7}$	$= \frac{1540}{7}$
d	$= 220\text{cm} \times 7$
d	$= 70\text{cm}$

17. The graph below shows a driver's journey from Masindi to Hoima and back to Masindi.



Calculate the driver's average speed for the whole journey.

$$\begin{aligned}
 \text{Average Speed} &= \frac{\text{Total Distance}}{\text{Total time}} \\
 &= \frac{40\text{km} \times 2}{5\text{h}} \\
 &= \frac{80\text{km}}{5\text{h}} \\
 &= 16\text{km/h}
 \end{aligned}$$

18. Write 949 in Roman Numerals.

$$\begin{aligned}
 949 &= 900 + 40 + 9 \\
 &= CM \quad XL \quad IX \\
 &= CMXIX
 \end{aligned}$$

19. Solve: $3^{3n} \div 3^n = 81$.

$$\begin{aligned}
 3^{3n-n} &= 81 \\
 3^{2n} &= 3^4 \\
 2n &= 4 \\
 \frac{2n}{2} &= \frac{4}{2} \\
 n &= 2
 \end{aligned}$$

3	81
3	27
3	9
3	3
	1

20. The distance on a map between the school Kitchen and the Main Hall is 12cm. Find the actual ground distance in kilometres, between the two places using a scale of 1:50,000.

1cm on map rep 50000cm on actual ground
12cm on map rep 12×50000 cm on actual ground
12cm on map rep 600000cm on actual ground

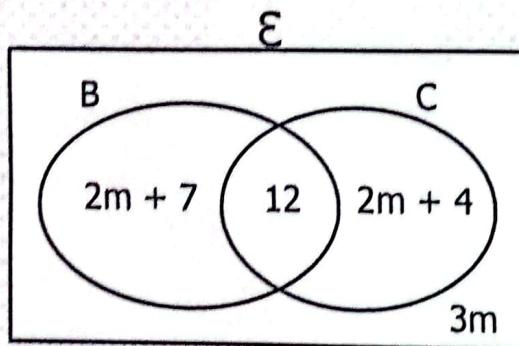
$$\begin{aligned}100000\text{cm} &= 1\text{km} \\600000\text{cm} &= \underline{600000} \\ &\quad 400000 \\600000\text{cm} &= 6\text{km}\end{aligned}$$

SECTION B: 60 MARKS

Answer all questions in this section

Marks for each question are indicated in brackets.

21. At a birthday party, Biscuits (B) and Cakes (C) were served as shown in the Venn diagram below.



- (a) If 19 guests were not served with biscuits, find the value of m.

$$\begin{aligned}2m + 4 + 3m &= 19 && \text{(02 Marks)} \\2m + 3m + 4 &= 19 \\5m + 4 &= 19 \\5m + 4 - 4 &= 19 - 4 \\5m &= 15 \\m &= 3\end{aligned}$$

- (b) Find the total number of guests that attended the party. (02 Marks)

$$\begin{aligned}\text{Total number of guests} &= 2m + 7 + 12 + 19 \\&= (2 \times m) + 7 + 12 + 19 \\&= (2 \times 3) + 19 + 19 \\&= 6 + 38 \\&= 44 \text{ guests}\end{aligned}$$

(c) Find the probability that a guest picked at random did not take any of the two eats. (01 Mark)

$$\begin{aligned} \text{Probability} &= \frac{n(D.C)}{n(T.C)} \\ &= \frac{(3 \times m)}{44} \\ &= \frac{3 \times 3}{44} \end{aligned}$$

$$\text{Probability} = \frac{9}{44}$$

22. (a) Write the place value of 3 in 431_{five} . (01 Mark)

431_{five}
 └ fives

(b) Find the value of 4 in (a) above. (02 Marks)

$$\begin{array}{l} 431_{\text{five}} \\ \quad \text{└ five fives} \\ \quad \quad 4 \times 10 \times 10 \\ \quad \quad 400_{\text{five}} \end{array}$$

OR

$$\begin{array}{l} 431_{\text{five}} \\ \quad \text{└ five fives} \\ \quad \quad 4 \times 5 \times 5 \\ \quad \quad 100_{\text{ten}} \end{array}$$

$$\begin{array}{rcl} 100 \div 5 &=& 20 \text{ rem } 0 \\ 20 \div 5 &=& 4 \text{ rem } 0 \\ 4 \div 5 &=& 0 \text{ rem } 4 \\ \text{The value of 4 is } 400_{\text{five}} \end{array}$$

(c) Workout: $101_{\text{two}} \times 11_{\text{two}}$. (02 Marks)

$$\begin{array}{r} 101_{\text{two}} \\ \times 11_{\text{two}} \\ \hline 101 \\ +101 \\ \hline 1111_{\text{two}} \end{array}$$

23. In a Mathematics test, 4 pupils scored 40 marks, 3 pupils scored 70 marks, 2 pupils scored 60 marks and the best pupil scored 90 marks.

(a) Workout the modal mark. (01 Mark)

Mark	Freq
40	4
70	3
60	2
90	1

$$\text{Modal mark} = 4$$

(b) Calculate the mean mark of the test. (03 Marks)

$$\begin{aligned} \text{Mean mark} &= \frac{\text{S.O.D}}{\text{N.O.D}} \\ &= \frac{(40 \times 4) + (70 \times 3) + (60 \times 2) + (90 \times 1)}{4 + 3 + 2 + 1} \\ &= \frac{160 + 210 + 120 + 90}{10} \\ &= \frac{580}{10} \end{aligned}$$

$$\text{Mean mark} = 58$$

24. The table below shows how a cyclist travelled from Iganga to Kampala.

Town	Arrival time	Departure time
Iganga	9:45a.m
Lugazi	10:30a.m	10:45a.m
Mukono	11:45a.m	12:00 noon
Kampala	1:15p.m

(a) Express the arrival time to Kampala In the 24-hour clock system.

HR MIN	(01 Mark)
12 : 00	
<u>+ 1 : 15</u>	
13 : 15hrs	

(b) Find the time the cyclist took to travel from Lugazi to Kampala.

HR MIN	(02 Marks)
12 : 75	
<u>+ 1 : 45</u>	
+ 10 : 45	
02 : 30hrs	

2 hours and 30 minutes

(c) If the distance between Lugazi to Kampala is 210km, calculate the average speed of the cyclist for the whole journey. (02 Marks)

Average Speed = $\frac{\text{Total Distance}}{\text{Total time}}$	= $210\text{km} \times \frac{2}{5\text{h}}$
	= $42\text{km} \times \frac{2}{h}$
	= 84km/h

25. Dad Tendo distributed books among her children; Margret, Faith and Daniel in the ratio 5:2:3 respectively. Both Margret and Faith got 12 more books than Daniel.

(a) Find the total number of books shared by the three children.

$\text{Total ratio} = 5 + 2 + 3$ $= 10\text{parts}$ $\text{Margret + Faith} = 5 + 2$ $= 7\text{ parts}$ $(\text{Margret + Faith}) - \text{Daniel}$ $7 - 3$ 4 parts	<u>Total number of books</u> (03 Marks) $12 \div \frac{4}{10}$ $12 \times \frac{10}{4}$ 3×10 30 books
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(b) Express Faith's share as a percentage of the total share. (02 Marks)

$$\frac{2}{10} \times 100\%$$

$$2 \times 10\%$$

$$20\%$$

$$\text{Faith's Share}$$

$$\frac{2}{10} \times 30$$

$$10$$

$$2 \times 3$$

6 books

As a percentage

$$\frac{6}{30} \times 100\%$$

$$30$$

$$2 \times 10\%$$

$$20\%$$

26. In a school of 1200 pupils, $\frac{2}{3}$ are boys and the rest are girls. If 40% of the girls and $12\frac{1}{2}\%$ of the boys are boarders, how many pupils are in boarding altogether? (05 Marks)

<u>Number of boys</u>	<u>Number of girls</u>	<u>girls in boarding</u>	<u>boys in boarding</u>
$\frac{2}{3} \times 1200$	1200	$\frac{40}{100} \times 400$	$12\frac{1}{2} \times 800$
$\frac{2}{3} \times 800$	$1200 - 800$	100	100
800 boys	400	40×4	25×8
		160 girls	2
			100 boys

Pupils in boarding

$$100 + 160$$

$$260 \text{ pupils}$$

Method 2

<u>Fraction of girls</u>	<u>Fraction of pupils in boarding</u>	<u>Total fraction</u>
$\frac{3}{3} - \frac{2}{3}$	<u>Girls</u>	$\frac{2}{15} + \frac{1}{12}$
$\frac{1}{3}$	$\frac{40}{100} \times \frac{1}{3}$	$\frac{12}{100} \times \frac{2}{3}$
$\frac{3-2}{3}$	$\frac{100}{100} \times \frac{1}{3}$	$\frac{100}{100} \times \frac{2}{3}$
$\frac{1}{3}$	$\frac{2 \times 1}{5 \times 3}$	$\frac{25 \div 100}{2} \times \frac{2}{3}$
$\frac{1}{3}$	$\frac{2}{15}$	$\frac{25}{2 \times 100} \times \frac{2}{3}$
		$\frac{1}{12}$

Number of pupils in boarding

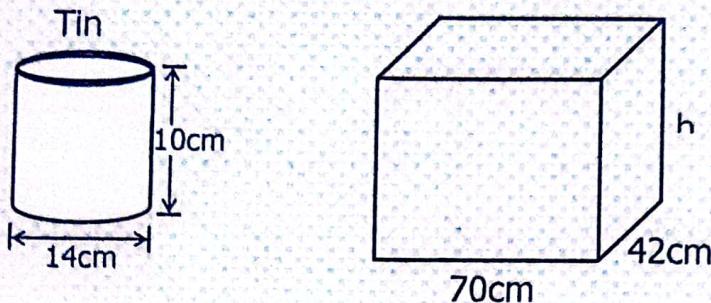
$$\frac{13}{60} \times 1200$$

$$60$$

$$13 \times 20$$

$$260 \text{ pupils}$$

27. Small cylindrical tins of diameter 14cm and height 10cm were packed in rectangular box of length 70cm and width 42cm as shown below.



- (a) Calculate the area of the lid used to cover the tin. (Use π as $\frac{22}{7}$)

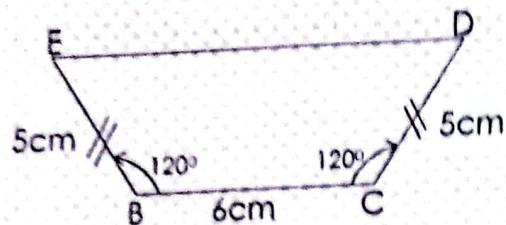
$$\begin{aligned} \text{Area} &= \pi r^2 && \text{(02 Marks)} \\ &= \frac{22}{7} \times \frac{14}{2} \times \frac{14}{2} \\ &= 22 \times 7 \text{cm}^2 \\ &= 154 \text{cm}^2 \end{aligned}$$

- (b) If 90 tins were packed in the box, find the height (h) of the box.

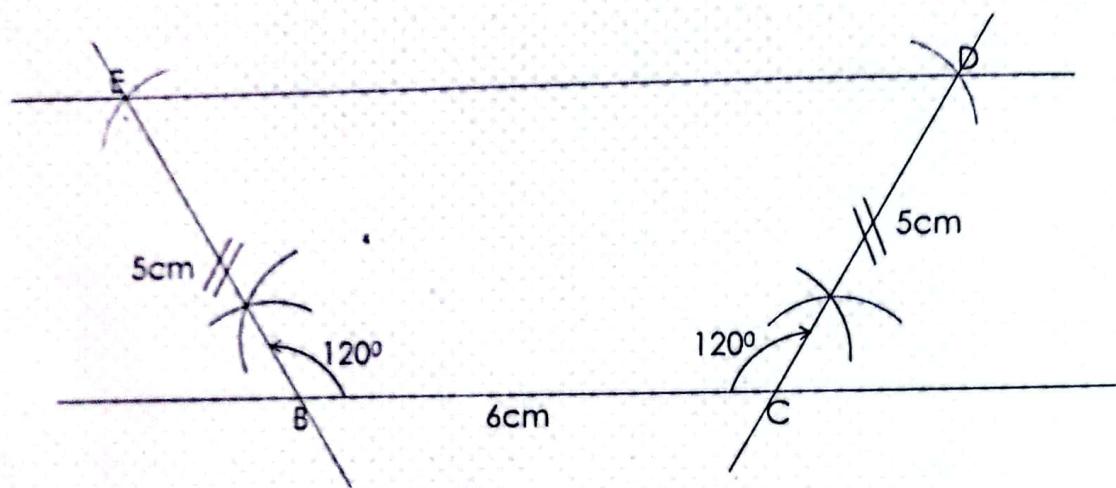
$$\begin{aligned} \frac{l}{d} \times \frac{w}{d} \times \frac{h}{h} &= \text{Number of tins} && \text{(03 Marks)} \\ \frac{70\text{cm}}{14\text{cm}} \times \frac{42\text{cm}}{14\text{cm}} \times \frac{h}{10\text{cm}} &= 90 \\ \frac{42 \times h}{2 \times 14\text{cm}} &= 90 \\ \frac{3h}{2\text{cm}} \times 2\text{cm} &= 90 \times 2\text{cm} \\ 3h &= 180\text{cm} \\ \frac{3h}{3} &= \frac{180\text{cm}}{3} \\ h &= 60\text{cm} \end{aligned}$$

28. (a) Using a ruler, a pencil and a pair of compasses only, construct a quadrilateral BCDE where $BC = 6\text{cm}$, $CD = BE = 5\text{cm}$ and angle $BCD = CBE = 120^\circ$. (05 Marks)

Sketch



Accurate diagram



Measure length ED. 10.7 // 10.8 // 10.9 cm. (01 Mark)

29. A trouser, a belt and a shirt cost Sh.50,000 altogether. A trouser costs 5 times as much as a shirt, a shirt costs Sh.6,000 more than a belt. How many belts can be bought with Sh.10,000? (05 Marks)

Let the cost of a belt be y

cost of a shirt be $y + \text{sh.}6000$

cost of a trouser be $5(y + \text{sh.}6000)$

$$\begin{aligned} y + y + \text{sh.}6000 + 5y + \text{sh.}30000 &= \text{sh.}50000 \\ 7y + \text{sh.}36000 &= \text{sh.}50000 \\ 7y + \text{sh.}36000 - \text{sh.}36000 &= \text{sh.}50000 - \text{sh.}36000 \\ \underline{\cancel{7y}} &= \underline{\cancel{\text{sh.}14000}} \\ y &= \text{sh.}2000 \end{aligned}$$

Number of belts bought with sh.10000

$$\frac{\text{sh.}10000}{\text{sh.}2000}$$

5 belts

30. An Estate Company fenced a circular piece land of diameter 56 metres using poles and two lines of barbed wire.

- (a) Find in metres, the length of the barbed wire that was used to fence the piece of land. (Use π as $\frac{22}{7}$) (02 Marks)

$$\begin{aligned} \text{Circumference} &= \pi d \\ &= \frac{22}{7} \times 56m \\ &= \frac{22 \times 56m}{7} \\ &= 22 \times 8 \\ &= 176m \end{aligned}$$

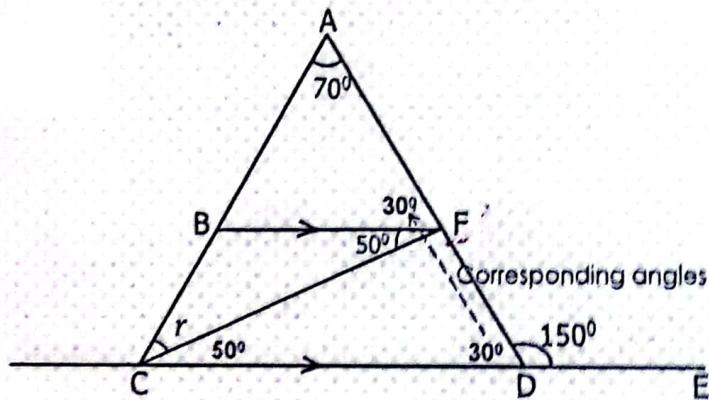
length of the barbed wire that was used

$$\begin{array}{r} 176m \\ \times \quad 2 \\ \hline 352m \end{array}$$

- (b) If the poles were fixed 800cm apart, find the number of poles that were used to fence the piece of land. (03 Marks)

$$\begin{aligned}
 \text{Number of poles} &= \frac{\text{distance}}{\text{interval}} \\
 \text{Distance} &= \text{circumference} \\
 \text{Circumference} &= 176\text{m} \\
 1\text{m} &= 100\text{c} \\
 176\text{m} &= (176 \times 100)\text{cm} \\
 &= 17600\text{cm} \\
 \text{Number of poles} &= \frac{17600\text{cm}}{800\text{cm}} \\
 \text{Number of poles} &= 22
 \end{aligned}$$

31. In the diagram below, line BF is parallel to line CE. Study it carefully and answer the questions that follow.



- (a) Find the value of r . (02 Marks)

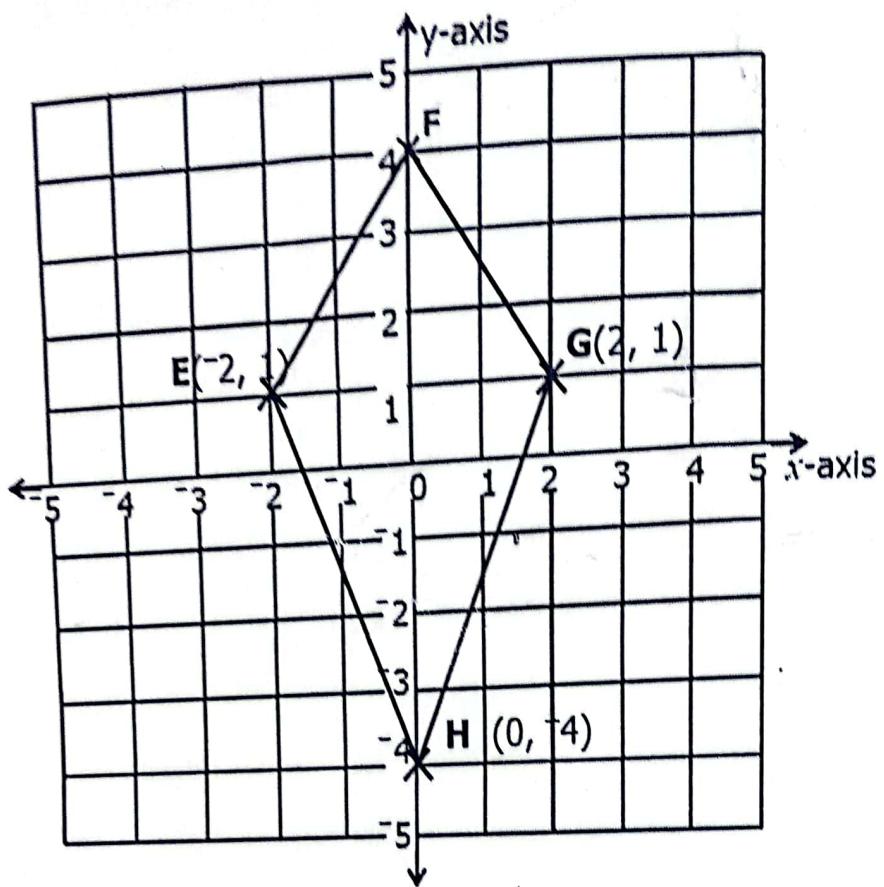
$$\begin{aligned}
 r + 50^\circ + 70^\circ + 30^\circ &= 180^\circ \\
 r + 150^\circ &= 180^\circ \\
 r + 150^\circ - 150^\circ &= 180^\circ - 150^\circ \\
 r &= 30^\circ
 \end{aligned}$$

- (b) Calculate the size of angle marked AFB. (02 Marks)

$$\text{Angle AFB} = 30^\circ \text{ (corresponding angles)}$$

32. On the cartesian plane below,

- (a) Plot the points, $E(-2, 1)$, $G(2, 1)$, and $H(0, -4)$



- (a) Write down the coordinates of point F . (01 Mark)

$F(0, 4)$

- (b) What geometric figure is formed when E is joined to F , E to H , H to G and F to G ? (02 Marks)

Kite